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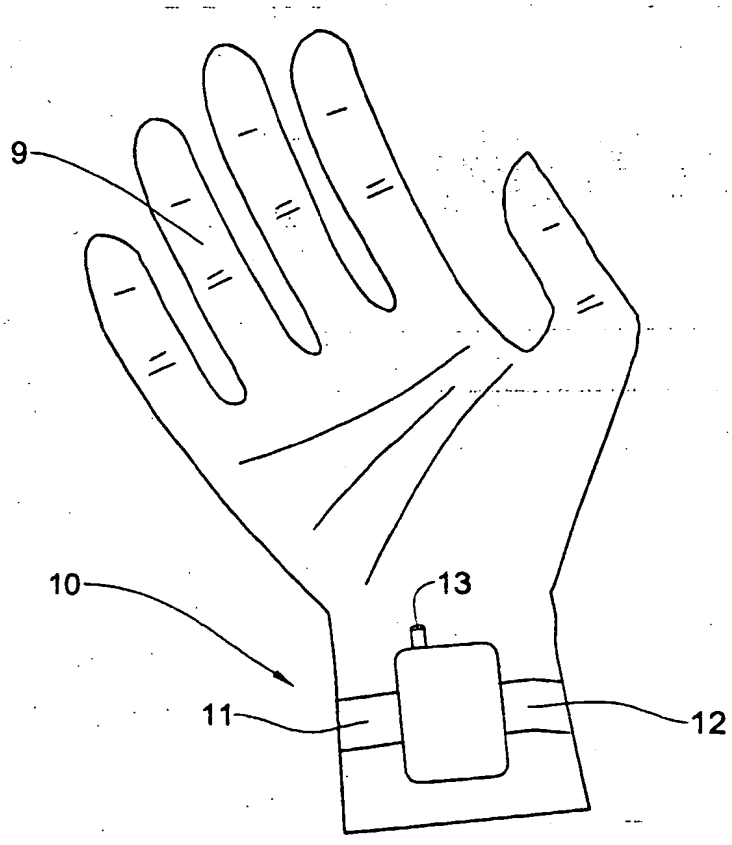

(57) Abstract: The invention concerns a patient device (10) present on the body of a patient which continuously monitors the patient's vital parameters and stores patient-related information. The invention further concerns a system comprising a server utility (21) (such as a computer present in a hospital ward) in wireless communication with a plurality of patient devices (22).

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PATIENT MONITORING DEVICE AND SYSTEM

FIELD OF THE INVENTION

The present invention is generally in the field of computerized hospital management and concerns a system for monitoring patients and various parameters associated with their medical condition within a medical facility. The present invention also concerns a device for use in such a system.

BACKGROUND OF THE INVENTION

A major problem in management of medical facilities, in particular hospitals, is in the control and monitoring of the treatment of a patient. When a patient enters a medical facility, information concerning the patient such as personal information and past medical history has to be recorded. During the hospitalization period in the medical facility information is added to the patient's record including data of vital parameters of the patient, for example, blood pressure, blood chemistry, heart rate, temperature, general condition, brain function); information concerning medical interventions carried out; information of medicaments administered to patient; lab results, etc. The net result is that there is a large number of different records which are accumulated for each patient, both when he enters the establishment and during the hospitalization period, and not all records are kept physically in the same location.

Typically, for each patient entering a medical facility a paper file is opened and all of the patient's data is physically assembled within the file, for example in the form of printed lab results, in the form of written summary of medical condition by the physician and the like. In addition, typically a chart is attached to the bed of the patient containing written information of his/her vital parameters (temperature,

blood pressure) medicaments administered and medical intervention to be carried out or already performed.

The collection and retrieval of all such data, dispersed at different locations (paper file, computer, a bed-attached chart) is problematic due to a number of reasons. For one, physical paper records may be lost, misplaced and handwritten is very often illegible. There is typically no backup or to records, so whatever information is lost cannot be retrieved. Additionally the retrieval of such data may at times be difficult and is time consuming and does not give real-time monitoring of the patient's condition.

The problem is at times further complicated in that several files for a single patient may be opened at different locations. For example one file may be opened at the radio-medicine department, another file in the laboratory and a third file in the emergency room. There is then the need to gather information from different sources in order to get an accurate picture of both the patient's parameters as well as his treatment.

Many patients administered to hospital today are unstable or potentially unstable and they need constant monitoring of vital parameters and the possibility to respond quickly to any significant change in these parameters.

The monitoring systems that exist today are relatively simple. The functions monitored by a single monitor are limited (i.e. a monitor for ECG, a monitor for blood pressure, a monitor for oxygen saturation etc.). The monitors themselves are large, they are located on a shelf or a stand near the patient's bed and connected to the patient via cables, a system that does not allow free movement of the patient for diagnostic procedures, washing, or even to the rest rooms.

Dangerous changes in the monitored parameters usually activate an alarm. Due to the complicated connections between the patient and the monitoring systems it is not uncommon for the alarms to be activated by artifactual readings and this decreases the medical staff's faith in the alarm system and the threshold for response decreases. The alarms themselves are usually based on a sound which if loud disturbs the other patients in the room and if is not loud enough is not heard by

the medical staff who may be located in another room or in the distant nurse station.

As unstable patients and critically ill patients undergo various evaluations like X-rays, CT scans etc., outside their department and it is not uncommon that critical changes in their medical condition occur when they are in these department. There is clearly a need for continuous monitoring when the patient is moved around the hospital and this function is not readily available with the present monitoring system. All these indicate that there is a major need for a *"wiser"* monitoring device that will be small, patient's held, and multifunctional with an accountable alarm system that will transmit the data to the central departmental station.

GENERAL DESCRIPTION OF THE INVENTION

In accordance with the invention an integrated solution to the problem of monitoring a patient's data is provided, including recording the patient's personal data, vital parameters, medicinal interventions, and medicaments administered.

In accordance with the invention, the patient entering a medical facility receives a patient device (hereinafter *"PD"*), which is an electronic device which has the ability to store patient data, to monitor and record patient vital parameters preferably in a continuous mode, and to communicate through a transceiver with other devices, or with the computerized server utility of the medical system. The device carries an identification code which identifies the patient and typically is attached to the patient's body during his/her entire hospitalization period.

The patient's personal and medical data which can be stored on a the PD of the invention includes for example: the name, age, and main medical condition of the patient, medical history of the patient. The personal data may also include such critical medical data such as drug allergies, blood types, anti-diabetes treatment and major diseases. This information may be loaded to the PD from the hospital's central computer (once the patient is admitted), from the archive of the health care provider, from the archives of health insurance company and the like. In addition this initial information may include instructions for medical interventions or

medicaments to be administered (entered to the device by a nurse or a physician) for example continuation of a drug, what administration the patient is already taking, the range of vital parameters beyond which an alarm would be given, etc.

The PD of the invention is capable of recording a patient's vital parameters due to the fact that it contains a plurality of sensors for these parameters. The patient's parameters are for example: blood pressure, heart rate, temperature, EKG, EEG, glucose level, oxygen blood level, contractions during labor, etc. The PD can also contain information for the range of normal vital parameters. Any variation from this ranges sets an alarm. Initially the PD contains a default range suitable to the patient's personal information (such as age, gender, basic medical condition, weight, etc.). However, this range may be changed at any point of time according to the patient's changed medical condition.

The PD of the invention can also communicate, through a transceiver, with other devices. As a minumum, the PD communicates with a server utility, which is present in the medical ward and is connects to a plurality of other PD devices. The server collects, and optionally gives information through the transceivers to each individual PD device as will be explained hereinbelow.

Examples of other devices with which the PD may communicate are other medicinal apparatuses which are used to treat or monitor patients such as: infusion pumps, labor monitors, EEG, EKG devices, etc.

Another device with which the PD of the invention can communicate through said transceiver is a medical personal device (hereinafter *"MPD"*) which is in fact an identification and input device which can communicate with the PD of the invention by transmission and receipt of information. Through said MPD device, physicians may enter instructions into the PD concerning future treatment to be carried out (both medical intervention and medicament regimes); and other technical support personnel, including nurses and technicians may also enter instructions, or confirm that instructions of the physician have been carried out. In addition, various medical comments can be added to the patient's record. The PD may alert the physician if some of the medical instructions given are not in

accordance with the patient's critical medical data, for example, administration of a drug the patient is allergic to, administration of a drug which is in combination with a medicament previously administered which is dangerous, or an accumulative administration of a drug in an amount which becomes dangerous.

Each medical personnel would have a permission level which is intrinsic to his/her MPD device, and the PD will accept said instructions only if they are in accordance with the permission level of said personnel. Examples of said MPD are any input devices, such as a handheld personal computer.

Another example is VR (Voice Recognition) systems which are implemented into the PD device and the main server utility. The VR software is implemented in the server utility and is translated to instructions in the PD system.

As indicated above the PD is in communication, through system transceivers, with the computerized server utility of the medical facility, for example a ward computer. This permits to centrally and continuously monitor the patient as well as to maintain centrally comprehensive medical records of the patient. For example, a nurse positioned at a server utility (computer) in a ward can monitor all vital signs recorded by all patients in a ward and be warned by an alarm given if patient's vital parameter extended beyond a critical predefined stage. A doctor of a ward may be able to verify whether all his instructions for medical intervention of patients were carried out, what is the condition of each patient, etc.

Thus, in accordance with the present invention there is also provided a patient monitoring system comprising a plurality of PD devices as described above, all of which are in communication with a server utility which holds a patient's database. The server utility is in continuous communication, (can read from and optionally also give information to), each individual PD.

The communication between each individual PD and the server utility is through wireless communication.

The wireless communication may assume a variety of modes. It may be achieved by radio signal, infrared irradiation or ultrasound irradiation forms. In many medical facilities the use of radio frequency transmission is banned inside the

patient's rooms, as it may interfere with the operation of a variety of sensitive medical instruments. Therefore radio communication can be used only in *"public areas"* of the facility, such as in waiting rooms, corridors, etc.

Inside patients' rooms other modes of communication should be used, such as IR communication, emanated from the PD devices, and sensed by IR sensors placed in the patient's room, which can pick up the signal and transmit it through wires to the server utility to which the sensors are connected. At times, the system may be designed such that it may operate with two different types of wireless transmission: for example by infrared communication at locations of medical facility which contains sensitive instruments such as inside patients' rooms; and at radio frequency communication, for example, using a Bluetooth type communication, in other locations of the medical facility. In such an embodiment, the PD as well as the MPD may be able to switch from one mode of wireless communication to another in different locations of the medical facility, said switching may be achieved for example, based on the type of signal they receive from their environment, for example according to the nearest present sensors sending the IR of RF signal.

The server utility of the system of the invention may be connected to other such server utilities, for example of other wards, of labs, of x-ray departments, etc. and may be connected to the main computer of the medical facility. In addition, the utility server may connect directly, or through the main computer of the medical facility, to personnel outside the medical facility, by external communication lines – for example through the Internet. This will enable permitted personnel placed outside the facility to retrieve data from the system – for example a physician of the ward present at home who is consulted as regards the condition of a particular patient. This will also enable the consultation with a physician which is present in a completely different medical facility or different country, based on data obtained through the external communication line.

By another possibility, the PD itself may be present outside the medical facility, for example, when the patient is released home with his/her personal PD,

but it may receive and transmit information through external communication lines (such as a telephone line) to the server utility for monitoring the patient also outside of the medical facility.

The system may include means for localizing the patient within the medical facility. The means may be in some internal module within the PD. An example is a localization system based on IR Tracking and RF (Cell) Localization within 10 meters range and a localization via IR tracking inside treatment rooms with other medical devices. In addition, and preferably, the localization of the PD, and hence of the patient, may be based on the system transceivers: the PD will be in communication with a specific transceiver based on his location within the medical facility (the nearest transceiver to the PD), and by identifying the communicating transceiver, a relatively accurate localization information may be obtained. This localization is important, for example, in case of a critical parameter data signal from the patient, which requires to alert the medical personnel immediately to the location where the patient is, even if the patient is not in his/her bed.

Thus, provided by the invention, and according to a first aspect, the invention concerns a patient associated device comprising:

(a) a fastener for fastening the device to the patient's body;

(b) a sensor for sensing at least one vital body parameter;

(c) an electronic module comprising a processor and a storing medium for storing data, the data comprising: patient personal data, patient medical data, data of said vital parameters, data concerning critical level of each of said vital parameters;

(d) a device transceiver coupled to said electronic module for communication with other devices, servers or systems of a medical facility for transmitting or receiving said data.

Provided by the invention in accordance with another aspect is a patient monitoring system comprising:

(a) a plurality of patient associated devices as defined above;

(b) a server utility holding a patient data database, the server utility being coupled to at least one server transceiver for communicating with the device transceiver for exchange of said patient data.

The invention will now be illustrated in the following description of some non limiting illustrative embodiments.

BRIEF DESCRIPTION OF THE DRAWINGS

In order to understand the invention and to see how it may be carried out in practice, a preferred embodiment will now be described, by way of non-limiting example only, with reference to the accompanying drawings, in which:

Fig. 1 shows a schematic drawing of a PD device of the invention;

Fig. 2 shows a schematic drawing of the system of the invention;

Fig. 3 shows schematically wireless communication between the device and the server; and

Fig. 4 shows a flow chart of activities associated with patient monitoring.

DETAILED DESCRIPTION OF THE INVENTION

I. PD Device

Fig. 1 shows a PD device **10** positioned on an area **9**. The PD device is composed of fastener **11**, for fastening the device to the patient's body, as well as a container **12** holding a sensor of at least one vital parameter. The fastener may be for example an elastic band, and the PD may be attached to any part of the body from which vital signs can be detected. By a preferred example, the PD is placed on the patient's wrists wherein a plurality of different parameters may be detected. The PD device may also have a connector **13** for plugging in and connecting to an MPD.

If the PD is used to monitor fetus vital parameters during labor, the PD may be placed on the patient's stomach.

Typical sensors present inside container **14** are sensors for defined clinical parameters of the patient.

The sensors are for example at least ECG sensors (similar to those used in Holter Monitoring), EEG sensors, sensors for blood pressure, blood glucose levels, blood oxygen saturation, body temperature, etc.

The sensors enable monitoring of the clinical parameters in real time; and documentation of the *"history"* of the clinical parameters for the duration of the hospital stay.

II. Patient monitoring system

Fig. 2 shows a schematic system **20** of the invention for monitoring patients. The system comprises a plurality of individual PD devices **22** typically up to 100 individual devices per one server utility unit **21**. The individual devices can communicate with the server, for example via wireless communication as will be explained hereinbelow. The server utility is typically placed in a hospital ward.

Some of the PD device may also be in communication with other server utilities of other wards, or of server utilities of other medical facility functions such as lab **24**.

All separate server utilities are typically connected to the hospital's main computer **25**.

III. Wireless communication

The communication between the PD device and the word server utility is carried out by wireless communication. A schematic mode of communication is shown in Fig. 3.

Patient room **30**, contains three patients, each one with a PD device shown schematically as **31, 32** and **33**. The patient's room also contains an infrared sensor **34**, which also sends signals (RF or IR) to each of the PD device. Said signal indicates to the device that it should function on the infrared mode.

Signals concerning patient's vital parameters sent from each PD is received by the sensor, and are then transferred through wires **38** to server utility **35**. The server utility can also transmit data to the PD device. Basically, the data is

information data, such as test results, laboratory functions, which are to be stored in the PD device.

Once the patient steps outside the room, for example to the waiting area **36**, he/she is outside of the signal range of the IR **34** sensor, and thus the PD device automatically switches to a radio frequency mode, which is the default mode. This RF is received by sensors for radio frequency present throughout the waiting area **37**. Again, all information is transmitted to the server utility. Once the patient steps again inside the room, then again the PD device automatically switches back to its infrared mode. The IR mode of the PD is used inside the medical and medical care institutes and in situations where RF is forbidden for medical purposes and others and requires special installations.

IV. Medical personnel device (MPD)

Each medical personnel, such as a doctor, a nurse, a technician carries upon it an I.D. and input device, which allows the medical personnel to communicate with each PD device, in order to enter in instructions, to change the range of vital parameters beyond which the PD gives an alarm, or to confirm that instructions, and medical intervention has been carried out etc. By one embodiment, said ID and input device is a handheld computer (*"palm computer"*) which is physically connectable with the PD device. This connection may be achieved either by wireless communication as described above or by physically plugging the MPD into the PD. Each medical personnel has a permission level which allows it to update and enter information into the PD device. For example, only physicians are allowed to change the range of vital parameters so that parameters which the PD gives an alarm for a specific patient; and only they are to give instructions for administration of medicaments. The physicians may, may enter through the handheld computer, enter instructions for medicaments, diet, etc., and then the other medical personnel such as nurses, dieticians, etc. can enter their own input, or confirm that these instructions have been carried out.

Doctors and other medical staff can also retrieve information from the PD as well as the server utility, so as to be informed of the patient's condition.

By another embodiment voice recognition systems used allows speech dictation recognition. The PD device may be transmitted or receive information from the MPD through such voice recognition mode.

V. Information of the position of the patient

The PD device of the present invention enables monitoring not only the medicinal condition of the patient, but also his/her location within the medical facility. Since each sensor (of radio frequency, or infrared as indicated above) has a specific identification code, and since each PD is associated by a specific code to a single patient, by associating the code of the sensor which receives the signal of a specific PD, it is possible to know exactly within a range of several meters, where a patient is present within the medical facility. Outside the medical facility the patient can be tracked by cell tracking, if the patient is in any open place or even close space (building, home, etc.).

VI. Communication of the server utility with other systems

The server utility which communicates with each PD device, is typically a server present in a specific ward, for example, a pediatric ward. This server utility may be in communication with server utilities of other wards. For example, if a child is hospitalized initially for surgery in the pediatric surgery ward, and is later transferred to the pediatric ward, the child's PD device may initially communicate with the pediatric surgery server utility, and later on with the pediatric server utility. The two server utilities can also be in communication, either directly, or through the medical central computer, to update medical information between the two.

The server utility may also communicate with other elements, which are present outside of the medical facility, through external communication lines, such as telephone lines using the Internet. This enables transfer of patients, or ward information to external sources, for example a doctor of the ward present at home

for the purpose of monitoring and consultation. This also enables to consult a physician present in another medical facility or another country, as regards the condition of a specific patient, while transferring to the physician the patient's information.

By another alternative, the patient carrying the PD device may leave the medical facility, for example, for his home, but still transfer information concerning for example vital parameters through the external communication lines, for example, through telephone lines. This will enable continuous monitoring of the patient even at home.

VII. Communication of the PD to other medicinal devices

The PD of the invention may also communicate, via wireless communication, with other medicinal devices such as an infusion system. This is achieved by utilizing an electronically activated adapter that is connected to the liquid of the infusion and can stop and start the liquid flow through the infusion. The adapter may be activated or stopped by wireless signal emitted from the PD device.

VIII. Communication to the central computer of the medical facility

The server utility of the ward is in communication with the central computer of the medical facility, for example of the hospital. This enables periodical backups of all the information present on the server utility (ward's) system (including the individual information received from each PD) on a central backup system so that information will not be lost.

In addition, this enables the transfer to archives of information concerning a specific patient, once the patient leaves the hospital, or alternatively, retrieval of information from archives once a patient enters the hospital. In addition, such communication enables charge to the various medical insurance companies in connection with various medical interventions, medicaments carried out and recorded on each specific PD.

IX. A specific example of patient monitoring

Reference is made to Fig. 4 which shows a general flowchart for monitoring of a specific patient. Patients entering the hospital may either be spontaneous patients **41** who are coming by their own or by relatives; patients referred to by the doctor of the healthcare system **42**, or patients who are emergency patients for example which came up after an accident **43**.

In cases, he healthcare patient **42** referred by his family doctor, his/her medical history and registration information are loaded from the hospital's computer to his/her allotted PD. The steps of automatic registration include personal information and information of his medical insurance **44**. Then the patient is registered and loaded onto a specific PD, which is physically attached to the patient. The PD is controlled by the pre-defined main department system but when it is out of range of one system, then it is being tracked by another system in all the coverage area of the hospital.

An emergency patient **43** is first assessed for his condition. If the condition is not very bad, then step **44** of registry on PD and connecting to PD may be carried out. If a situation is very bad, then step **44** is eliminated and step **46** takes place instead wherein the PD is placed on a patient, identified (for example by entering any basic identification the patient carries on his person), and the critical parameters are set by a doctor and record of treatment of all medical interventions is carried out. If a spontaneous patient enter the hospital, it should be determined whether the patient can be examined, and then according to his/her condition, he/she may proceed via steps **44** or **46** above, or if he/she cannot be examined, he/she may be sent to a different institute center **47**.

Then the patient goes into a hospital department A, B or C, (**48**, **49** and **50**) and is accepted by the nurse **51**. The PD device enables tracking of the patients through various departments and verifying his/her position.

Once the patient is inside the department, all his/her medical data is controlled as described above including medicaments administered, medical

interventions taken place, vital parameters recorded, etc. as shown schematically in **52**. In cases **53** where the patient's vital parameters exceed the pre-set range, the patient cannot be tracked, then alert is activated. (**53,54**).

A specific example is connection of the patient to an infusion, which if required may be controlled by the PD device as described above.

At times there is a requirement to consolidate without outside experts on the patient's condition, and in that case information from the server utility may be connected through to the Internet to outside sources **55**. Once the patient is ready to leave the hospital, the system issues a summary of patient medical and submits it to the hospital central computer system, for archive purposes and can be automatically backed up for maintenance **57**. When the patient leaves, his information is stored on the medical facility's central computer system and his/her individual PD device is returned to the emergency room or in a department to be loaded to a new patient.

By another embodiment, the specific PD device leaves the hospital with the patient for continuous monitoring of the patient's condition at home as described above.

X. Alert features

The PD of the device of the invention gives an alert if a critical condition is achieved.

(a) Automatic default alerts for the clinical parameters

These parameters and their range will be based on nomograms taking into account patient's variants like age , gender, weight etc. Deviation from the normal/accepted range will alert the medical staff as well as the patient.

(b) Flexible clinical alert parameters

In addition to the predefined defaults alert parameters, the system is flexible in a manner that it enables to easily change the parameters according to the individual patient's condition.

The change can be done either by physically placing a hand held device (MPD) to the PD or by voice commands.

(c) Alert to treatment deviations.

In addition to the patient's related parameters the system will be able to monitor various external important parameters like intra venous infusions of drugs. The required rate of the infusion will be handled by the system as a flexible parameter and will alert the medical staff if a deviation from the range occurs.

(d) Alert to improper medical instructions

Medical instructions entered which are dangerous, such as administration of a drug to which a patient is allergic, additional administration of a drug which accumulated amounts exceed stated dosage; administration of a drug which is dangerous in combination with a drug previously administered; will also activate the alert.

XI. Patent Related Data

The data stored for the patients is as follows:

(a) Personal data

The first step is the registration of personal data upon entrance to the hospital. This serves as an identification code for the patient while performing various laboratory tests. The personal data will include also critical data such as blood-type; allergies' anti-diabetes treatment; drug sensitivity, etc. This data may be also used for alert purposes, i.e. if a patient receives incompatible (according to ID) blood unit is will operate the alert system, if patient prescribed a drug that is incompatible due to allergy, drug interaction, etc.

(b) An automatic real time interactive system

The PD device will document the medical treatment that the patient is getting in the hospital. It will include the prescription of drugs as well as the execution of the instructions. This feature will be used for

documentation as well as for alert purposes. An alert will be operated for example if an incompatible combination of drugs will be described.

CLAIMS:

1. A patient associated device comprising:

(a) a fastener for fastening the device to the patient's body;

(b) a sensor for sensing at least one vital body parameter;

(c) an electronic module comprising a processor and a storing medium for storing data, the data comprising: patient personal data , patient medical data, data of said vital parameters , data concerning critical level of each of said vital parameters;

(d) a device transceiver coupled to said electronic module for communication with at least one other device, server or system of a medical facility for transmitting or receiving said data.

2. A device according to Claim 1 wherein the communication with other devices, servers, or systems of the medical facility is achieved by wireless communication.

3. A device according to Claim 2 wherein the wireless communication is optical communication.

4. A device according to Claim 3 wherein the optical communication is infrared (IR) communication.

5. A device according to Claim 2 wherein the wireless communication is radio frequency (RF) communication.

6. A device according to Claim 2 wherein the wireless communication can switch between IR and RF communication modes.

7. A device according to Claim 2 wherein the wireless communication is ultra sonic (US) communication.

8. A device according to Claim 1 wherein at least one of said other devices is a handheld computer.

9. A device according to Claim 8, comprising a connector for coupling the device to said handheld computer.

10. A device according to Claim 1 wherein the fastener is adapted to fasten the device to the wrist of the patient.

11. A device according to Claim 1, further comprising a localization module.

12. A device according to Claim 1 wherein the vital parameter is selected from: blood pressure, heart rate, temperature, blood glucose level, oxygen glucose level, brain electrical activity. EKG and contractions.

13. A patient monitoring system comprising:

(a) a plurality of patient associated devices according to Claim 1;

(b) a server utility holding a patient data, database, the server utility being coupled to at least one server transceiver for communicating with the device transceiver for exchange of said patient data.

14. A system according to Claim 13, wherein the data comprises: patient personal data, patient medical data, data of said vital parameters, data concerning critical level of said vital parameters.

15. A system according to Claim 14, wherein the vital parameter is selected from: blood pressure, heart rate, temperature, blood glucose level, oxygen glucose level, brain electrical activity. EKG and contractions.

16. A system according to Claim 13, wherein the communication between the server and the device is wireless communication.

17. A system according to Claim 16, wherein the wireless communication is optical communication.

18. A system according to Claim 17, wherein the optical communication is infrared (IR) communication.

19. A system according to Claim 16, wherein the wireless communication is radio frequency (RF) communication.

20. A system according to Claim 16, wherein the wireless communication can revert between IR and RF modules.

21. A system according to Claim 16, wherein the wireless communication is ultra sonic (US) communication.

22. A system according to Claim 13, coupled to a medical facility main server.

23. A system according to Claim 13, comprising different servers in different departments of the medical facility.

24. A system according to Claim 13, for monitoring patients outside a medical facility wherein the server's transceiver is coupled to the device transceiver through external communication lines.

25. A system according to Claim 17, comprising optical sensors for receiving optical signal emitted from patient's associated device and transmitting them, through wire communication, to the server.

26. A system according to Claim 13, comprising a localization sub-system for localizing the device within the medical facility; the localization subsystem comprises a module within the device for emitting a localization signal.

27. A system according to Claim 13, comprising a localization sub-system for localizing the device within the medical facility; the localization subsystem comprises system transceivers in different locations of the medical facility, and the system server being capable of identifying the transceiver in communication with the device and then identifying said location.

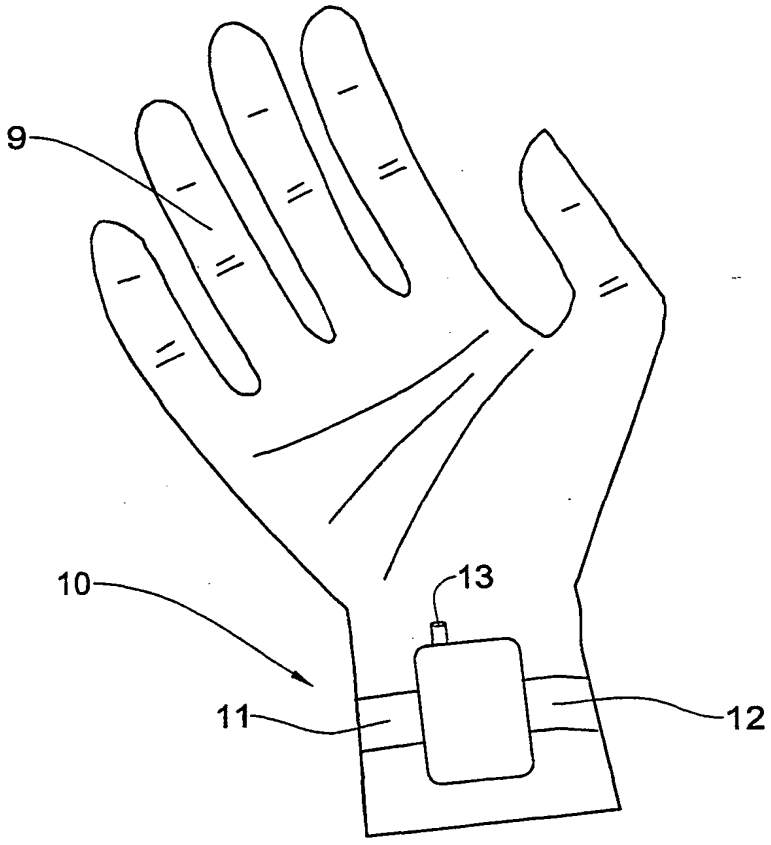


FIG. 1

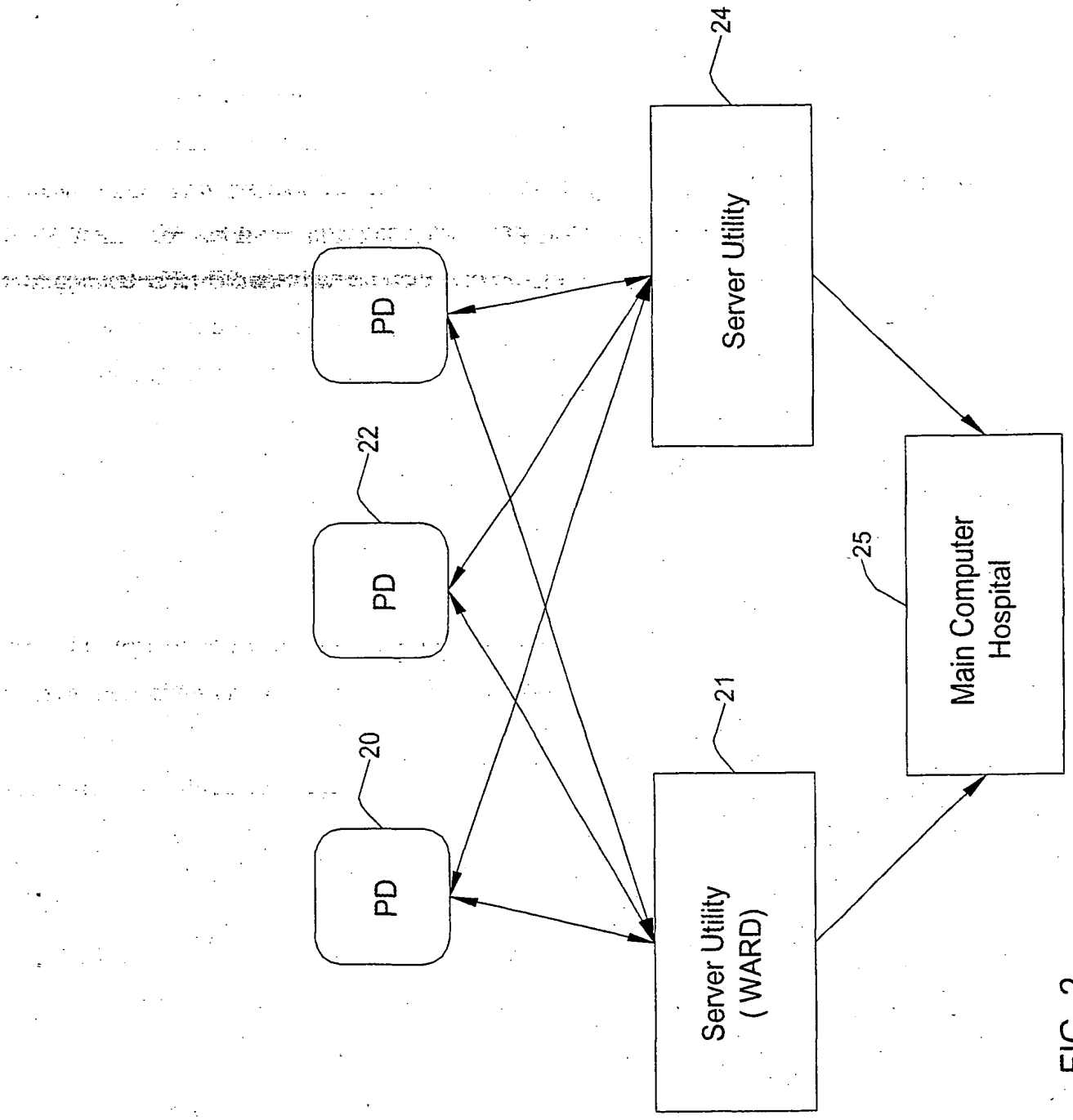

24
Server Utility
PD
22
PD
20
PD
21
Server Utility
(WARD)
25
Main Computer
Hospital

FIG. 2

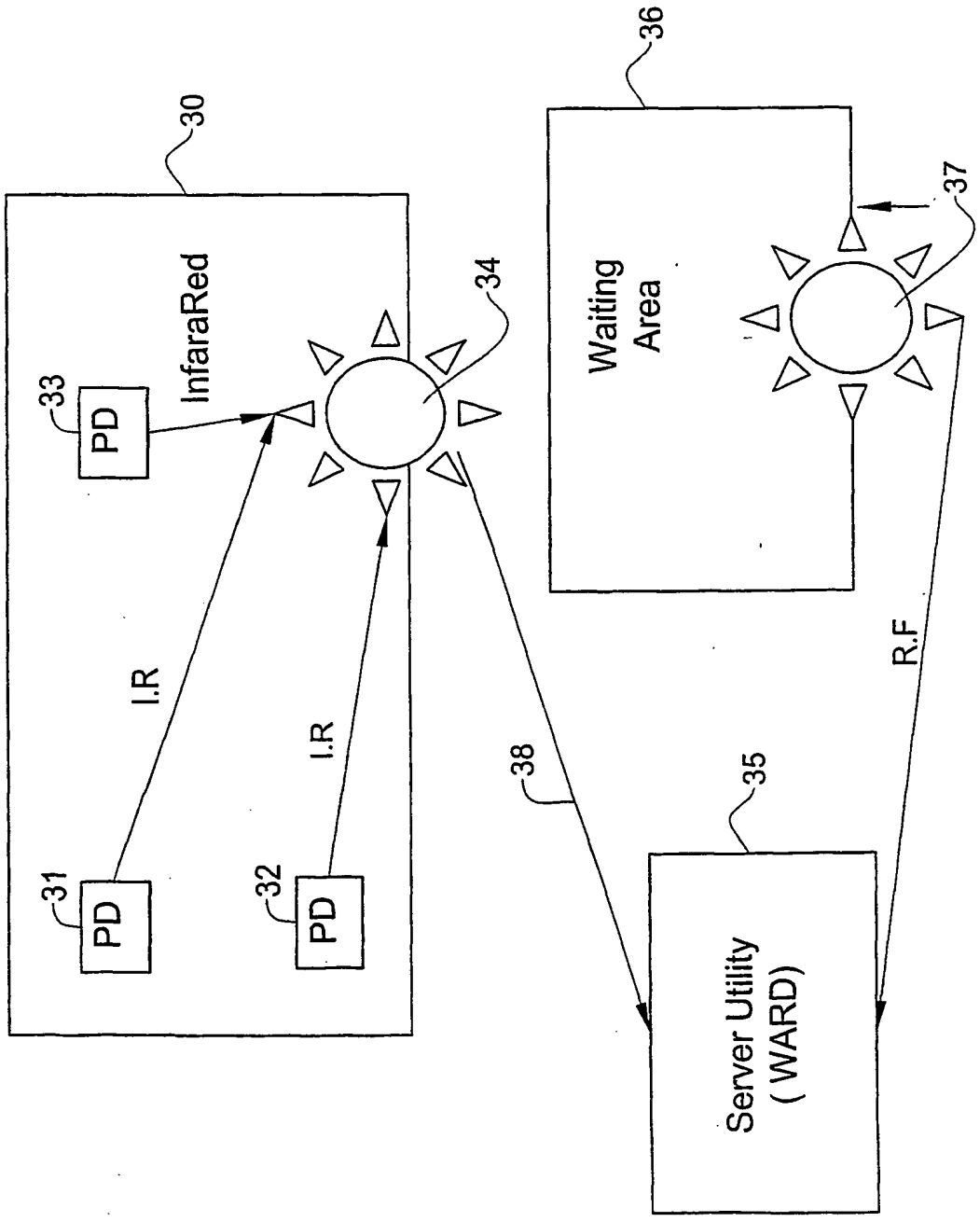

30
InfaraRed
33
PD
34
I.R
I.R
31
PD
32
PD
36
Waiting
Area
37
38
35
Server Utility
(WARD)
R.F

FIG. 3

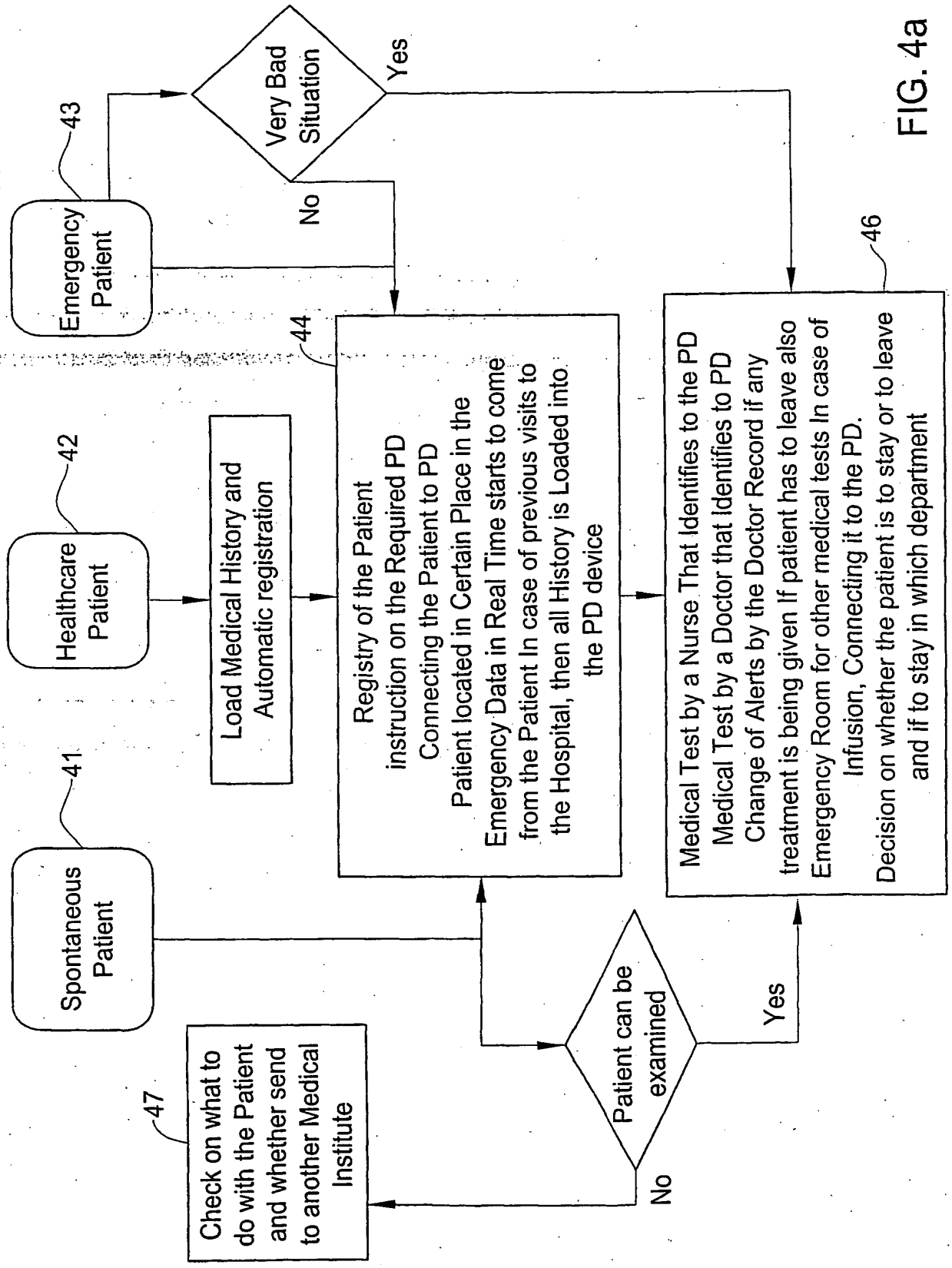

Emergency Patient
43
Very Bad Situation
Yes
No
Healthcare Patient
42
Load Medical History and Automatic registration
Spontaneous Patient
41
Registry of the Patient instruction on the Required PD Connecting the Patient to PD Patient located in Certain Place in the Emergency Data in Real Time starts to come from the Patient In case of previous visits to the Hospital, then all History is Loaded into the PD device
44
Medical Test by a Nurse That Identifies to the PD Medical Test by a Doctor that Identifies to PD Change of Alerts by the Doctor Record if any treatment is being given If patient has to leave also Emergency Room for other medical tests In case of Infusion, Connecting it to the PD. Decision on whether the patient is to stay or to leave and if to stay in which department
46
Patient can be examined
Yes
No
Check on what to do with the Patient and whether send to another Medical Institute
47

FIG. 4a

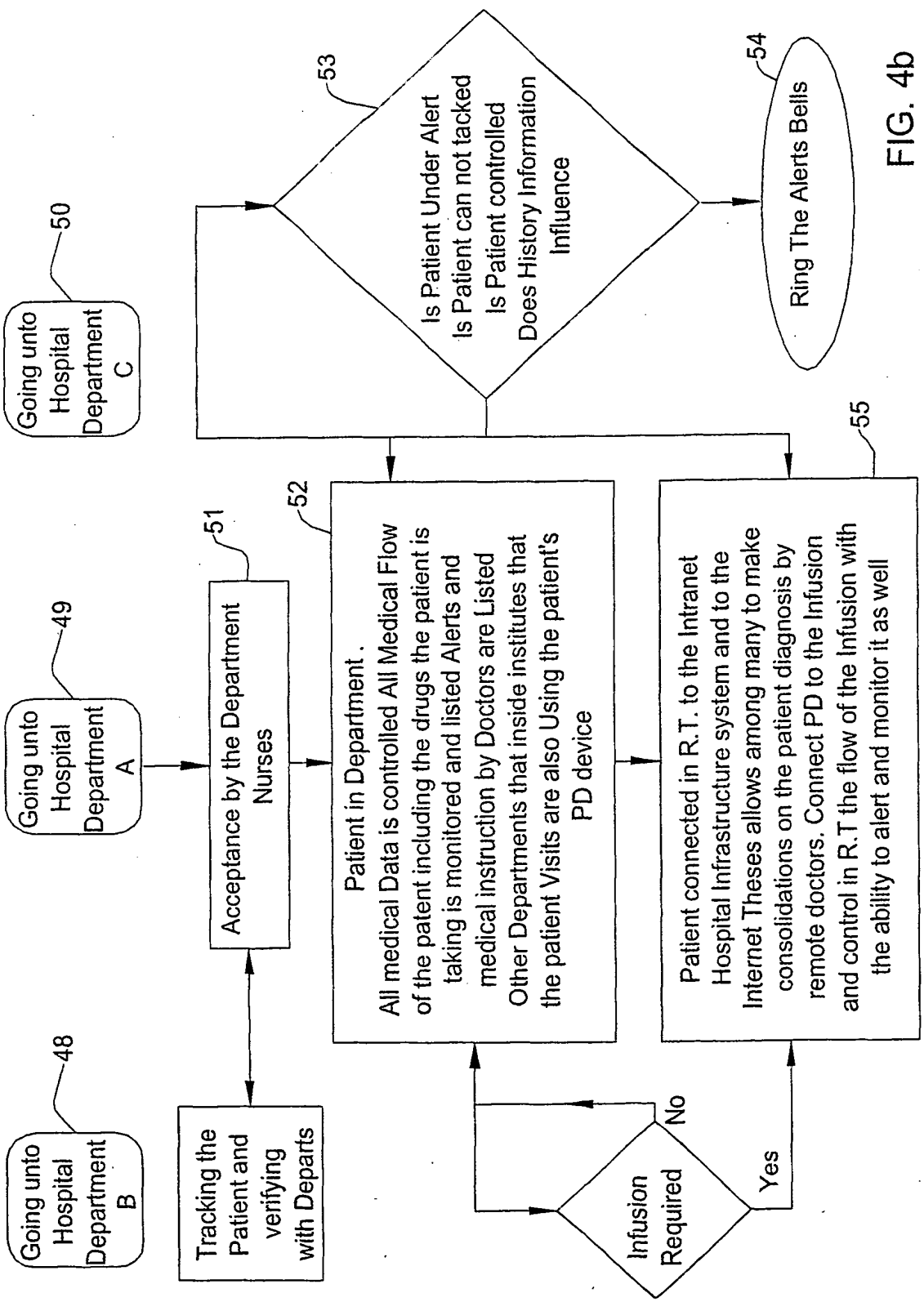
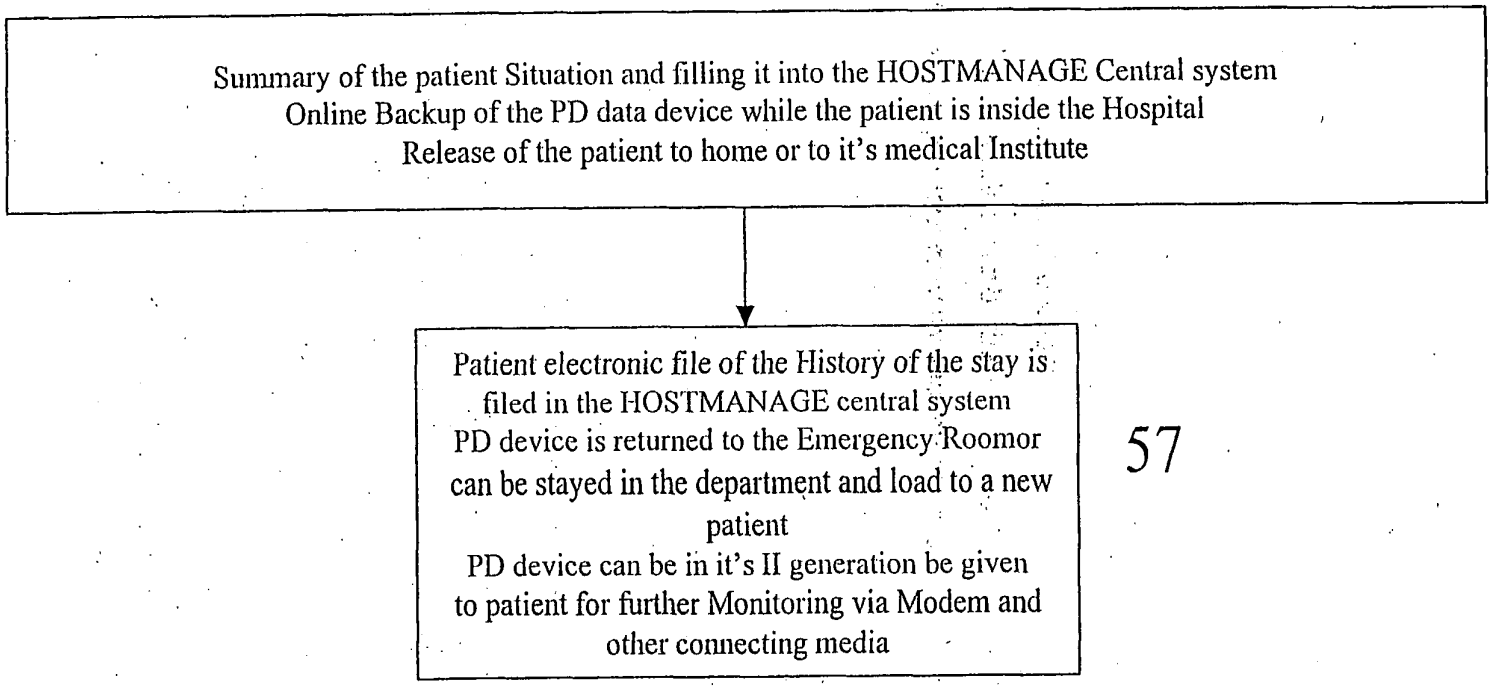

Going unto Hospital Department A
49
Going unto Hospital Department B
48
Going unto Hospital Department C
50
Acceptance by the Department Nurses
51
Tracking the Patient and verifying with Departs
Patient in Department .
All medical Data is controlled All Medical Flow of the patent including the drugs the patient is taking is monitored and listed Alerts and medical instruction by Doctors are Listed Other Departments that inside institutes that the patient Visits are also Using the patient's PD device
52
Is Patient Under Alert
Is Patient can not tacked
Is Patient controlled
Does History Information
Influence
53
Ring The Alerts Bells
54
Patient connected in R.T. to the Intranet Hospital Infrastructure system and to the Internet Theses allows among many to make consolidations on the patient diagnosis by remote doctors. Connect PD to the Infusion and control in R.T the flow of the Infusion with the ability to alert and monitor it as well
55
Infusion Required
No
Yes

FIG. 4b

Fig 4 c


Summary of the patient Situation and filling it into the HOSTMANAGE Central system
Online Backup of the PD data device while the patient is inside the Hospital
Release of the patient to home or to it's medical Institute
Patient electronic file of the History of the stay is filed in the HOSTMANAGE central system
PD device is returned to the Emergency Roomor can be stayed in the department and load to a new patient
PD device can be in it's II generation be given to patient for further Monitoring via Modem and other connecting media
57

INTERNATIONAL SEARCH REPORT

nal Application No
PCT/IL 02/00039

A. CLASSIFICATION OF SUBJECT MATTER
IPC 7 A61B5/00

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 7 A61B G08B

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EPO-Internal, WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 6 072 396 A (J. J. GAUKEL) 6 June 2000 (2000-06-06) column 7, line 21 -column 8, line 35	1,2,5, 10-16,19
Y	column 10, line 53 -column 12, line 32	3,4,6,7, 17,18, 20-27

X	US 5 724 025 A (I. TAVORI) 3 March 1998 (1998-03-03) column 2, line 46 -column 4, line 5	1-5,8,9, 11,12
Y	column 5, line 40 - line 64	6,7, 13-27

X	US 3 972 320 A (G. U. KALMAN) 3 August 1976 (1976-08-03)	1,2,5, 10,12
Y	column 1, line 53 -column 7, line 32	3,4,6,7, 13-27

	-/--	

[X] Further documents are listed in the continuation of box C.

[X] Patent family members are listed in annex.

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"A" document defining the general state of the art which is not considered to be of particular relevance

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"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

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"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
18 June 2002	27/06/2002

Name and mailing address of the ISA	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Tx. 31 651 epo nl, Fax: (+31-70) 340-3016	Geffen, N

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INTERNATIONAL SEARCH REPORT

International Application No
PCT/IL 02/00039

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	US 3 572 316 A (J. H. VOGELMAN ET AL) 23 March 1971 (1971-03-23) column 2, line 57 -column 6, line 29	1-5,7, 10-19, 21-27
Y	US 5 218 344 A (J. G. RICKETTS) 8 June 1993 (1993-06-08) column 6, line 15 -column 8, line 33	1-5,7, 10-19, 21-27
Y	US 4 958 645 A (T. E. CADELL ET AL) 25 September 1990 (1990-09-25) column 2, line 31 -column 4, line 34	1-7, 11-21, 26,27

INTERNATIONAL SEARCH REPORT

Information on patent family members

nal Application No
PCT/IL 02/00039

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
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		US 6337665 B1	08-01-2002
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US 5218344 A	08-06-1993	NONE	
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